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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
QI, ZHI QIANG	
ART UNIT	**PAPER NUMBER**
2871	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/24/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/649,738	CHOI ET AL.	
	Examiner	Art Unit	
	Mike Qi	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2007 and 05 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-6,9,12 and 21-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-6,9,12 and 22* is/are rejected.

7)☒ Claim(s) *21 and 23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/5/07*..
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4-6, 9, 12 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,514,426 (Eguchi) in view of US 6,614,491 (Hasegawa et al), US 4,709,994 (Kanbe et al), and further in view of US 6,351,301 B1 (Takatori).

Regarding claims 1, 9 and 22, **Eguchi** teaches (col.5, lines 37 – 53; col.7, lines 23 – 30; Fig.1) that a liquid crystal display comprises:

- a liquid crystal (15) is disposed (injected) between a pair of substrate (11a, 11b) (upper and lower plates) which coated with transparent electrodes (12a, 12b) (wherein the upper and lower plates have electrodes respectively formed thereon);
- an upper alignment film (14a) formed on the upper plate (11a);
- a lower alignment film (14b) formed on the lower plate (11b);
- in order to provide the alignment film with a better alignment effect, it is preferred to rub the surface of the alignment film, and the rubbing is applied to only one of the substrates having an alignment film (see col.7, lines 23-30), i.e., only one of the alignment film on the upper plate and the lower plate is

aligned so as to determine an incipient alignment direction of the liquid crystal;

- assembling the upper plate and the lower plate in order to assemble the device;
- polarizers (17a,17b) mounted on external surfaces of the upper and lower plates (11a, 11b) respectively;
- using ferroelectric liquid crystal (col.5, lines 37-53), and the liquid crystal material used in such display is not particularly limited (see col.10, lines 17-18) that means possible to use a Half V-Switching mode, and **Takatori** teaches using ferroelectric liquid crystal having a Half V-Switching mode.

Eguchi does not explicitly teach that:

1) a tilted long axis of the liquid crystal (i.e., the optical axis of the liquid crystal molecules) is coincident with a transmission axis of at least one of the polarizers;

2) the transmissive axis of one of the polarizers is at an angle within 1 to 10 degree with respective to alignment direction of aligned one of the alignment films;

3) applying a DC voltage to the liquid crystal while the ferroelectric liquid crystal is transiting from nematic phase to a smectic C phase, thereby maintaining a monostable state having Half V-Switching mode.

Hasegawa teaches (col.9, line 44 – col.10, line 6; Fig.1) that the transmitting axis of one polarizer (38) was parallel to the optical axis of the liquid crystal molecules (50), i.e., a tilted long axis of the liquid crystal is coincident with a transmission axis of one of the polarizers. Hasegawa further teaches (col.9, lines 55-66) that in such case, the light

was hardly leaked out from the non-pixel portion, so that a higher contrast and more wide viewing angle obtained.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Eguchi with the teachings of arranging a tilted long axis of the liquid crystal is coincident with a transmission axis of at least one of the polarizers as taught by Hasegawa, since the skilled in the art would be motivated for preventing the light leakage so as to obtain a higher contrast and more wide viewing angle display (col.9, lines 55-66).

Eguchi and Hasegawa teach the invention set forth above except for that the transmissive axis of one of the polarizers is at an angle within 1 to 10 degree with respective to alignment direction of aligned one of the alignment films.

Kanbe teaches (col.6, lines 48– 66; Fig.3) that under certain condition, forming an angle between the rubbing direction (axis O) (the alignment direction) and the transmission axis of a polarizer (axis P1) is 6 degree, the display having a maximum contrast.

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exits (see MPEP 2144.05 I).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Eguchi and Hasegawa with the teachings of setting an angle 1 to 10 degree of a transmissive axis of a polarizer with respective to an alignment direction of the aligned one of the alignment films as

taught by Kanbe, since the skilled in the art would be motivated for achieving a maximum contrast (col.6, lines 48– 66).

Eguchi, Hasegawa and Kanbe teach the invention set forth above except for that applying a DC voltage to the liquid crystal while the ferroelectric liquid crystal is transiting from nematic phase to a smectic C phase, thereby maintaining a monostable state having Half V-Switching mode.

Takatori teaches (col.3, lines 30-47) that the ferroelectric liquid crystal employs a monostable FLC having a Half V-shaped switching mode (i.e., the ferroelectric liquid crystal maintains a monostable state having Half V-Switching mode), and this monostable FLC is formed by phase transition (from nematic N to smectic C) while applying a voltage to the FLC material (conventionally DC voltage), and the monostable FLC having Half V-switching mode has the correspondence in which a brightness is changed only by one polarity of a voltage (i.e., DC voltage), so as to attain the continuous grayscale display, and that is disclosed in certain prior art references such as in "Structure And Properties of ferroelectric Liquid Crystal", pp.240-241 (Corona Corpration, 1990).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Eguchi, Hasegawa and Kanbe with the teachings of the ferroelectric liquid crystal having a Half-V switching mode maintaining monostable state by applying DC voltage as taught by Takatori, since the skilled in the art would be motivated for attaining the continuous grayscale display.

Regarding claims 4 and 5, Eguchi teaches (col.7, lines 23 – 30) that in order to

provide the alignment film with a better alignment effect, it is preferred to rub the surface of the alignment film, and the rubbing is applied to only one of the substrates or both substrate each having an alignment film (to align the upper alignment film as claimed in claim 4 or to align the lower alignment film as claimed in claim 5).

Regarding claim 6, Eguchi teaches (col.5, lines 43 – 53) that the liquid crystal layer (15) with a thickness (cell gap) 0.1 – 3 microns which is sufficiently small to suppress the formation of a helical structure of the liquid crystal (15), and that the cell gap is overlap with the cell gap 1.4 – 1.5 microns as claimed in claim 6.

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exits (see MPEP 2144.05 I).

Regarding claim 12, Eguchi teaches (col.11, lines 27 –43; Fig.4) that when the electric filed Ea is applied to the liquid crystal molecules, they are oriented in the first stable state (33a); and when the electric field Eb is applied to the liquid crystal molecules, the liquid crystal molecules are oriented to the second stable state (33b); and as long as the magnitude of the electric field being applied is not above a certain threshold value, the liquid crystal molecules are placed in the respective orientation states. Therefore, in order to obtain a certain orientation state, when injecting the liquid crystal between the two substrates, a certain electric field should be applied, and such electric field is for maintaining an incipient alignment direction of the liquid crystal.

Allowable Subject Matter

3. Claims 21 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter:

Claims 21 and 23 contained allowable subject matter because the prior art of record neither anticipate nor rendered obvious that a liquid crystal display comprises various related elements as claimed with specific features recited in claims 21 and 23:

the transmissive axis of at least one of the polarizers (or the one of the polarizers) is at an angle within a range of 9 to 10 degrees with respect to an alignment direction of the aligned one of the upper and lower alignment films (or with respect to the alignment direction of the aligned alignment film).

The reference Kanbe teaches (col.6, lines 48– 66; Fig.3) that under certain condition, forming an angle between the rubbing direction (axis O) (the alignment direction) and the transmission axis of a polarizer (axis P1) is 6 degree (within a range of 1 to 10 degree), the display having a maximum contrast, but Kanbe does not teach the angle is at an angle within a range of 9 to 10 degree as claimed.

Response to Arguments

5. Applicant's arguments filed on March 14, 2006 have been fully considered but they are not persuasive.

In response to applicant's argument that the references do not teach the liquid crystal display device having the "ferroelectric liquid crystal of Half V-Switching mode", it is respectfully pointed out that Takatori teaches (col.3, lines 30-47) that the ferroelectric liquid crystal employs a monostable FLC having a Half V-shaped switching mode (i.e., the ferroelectric liquid crystal maintains a monostable state having Half V-Switching mode), and this monostable FLC is formed by phase transition (from nematic N to smectic C) while applying a voltage to the FLC material (conventionally DC voltage), and the monostable FLC having Half V-switching mode, and the skilled in the art would be motivated for attaining the continuous grayscale display.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299. The examiner can normally be reached on M-T 7:30 am-6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mike Qi
Patent examiner
April 18, 2007